PATENT SPECIFICATION

(11) 1 433 890

1 433 890

(21) Application No. 44468/73 (22) Filed 21 Sept. 1973

(23) Complete Specification filed 20 Dec. 1974

(44) Complete Specification published 28 April 1976

(51) INT CL² C22C 21/00

(52) Index at acceptance

C7A 713 742 783 78Y B249 B25X B25Y B289 B309 B319 B325 B327 B329 B32Y B331 B333 B335 B337 B339 B33X B349 B357 B359 B35Y B361 B363 B365 B367 B369 B36X B377 B379 B37Y B381 B383 B385 B387 B389 B38X B399 B419 B425 B427 B429 B42Y B431 B433 B435 B437 B439 B43X B440 B44Y B46Y B475 B477 B479 B481 B483 B485 B487 B489 B48X B509 B50Y B511 B513 B515 B517 B519 B51X B539 B549 B559 B610 B613 B616 B619 B621 B624 B627 B62X B630 B635 B661 B663 B665 B667 B669 B66X B670

(19) THE PATENT OFFICE LONDON

(72) Inventors HAMISH DUNDAS WILSON, DAVID FREDERICK GREEN and PETER EDWARD VICKERY

(54) IMPROVEMENTS IN OR RELATING TO BEARINGS

PATENTS ACT 1949

SPECIFICATION NO 1433890

The following amendments were allowed under Section 29 on 25 January 1980:

Page 2,line 6, *delete* thickness *insert* width

THE PATENT OFFICE
22 February 1980

Bas 74055/9

bearing surface to the bearing housing is not impeded by the relatively low thermal conductivity of a steel backing on the bearing. Aluminium tin alloys in which the alloy content comprises 18% to 22% by weight of the whole have very good bearing properties but are relatively weak whereas aluminium alloys containing 6% tin by weight are stronger but do not have such good bearing properties.

The invention provides a method of manufacturing a bearing material comprising taking a strip consisting solely of an alloy comprising aluminium and tin in "as cast condition" and containing 18% to 22% by weight of tin, and cold rolling the strip to increase the strength of the strip.

The cold rolling of the strip improves the strength of the strip to a stage where the strip can be used for unbacked bearings.

It is preferred that the cold rolling of the

inch. The elongation of such strip measured using a British Standard test piece to fraction is 10%.

Following the final cold rolling of the strip, the strip is blanked to form bearings such as ring or half thrust washers cylindrical bushes, conical bushes or conical washers.

The following is a description of a specific embodiment of the invention.

The starting material used is cast aluminium tin strip containing approximately 20% tin by weight having a thickness of 15 mm. The strip initially has a hardness of Rockwell H 47 to 52, an ultimate tensile strength of 4 to 6.5 tons per square inch and a British Standard test piece of the material has an elongation at fracture in the range 12 to 20%.

The strip is cold rolled to a thickness of 3.8 mm and is then annealed at 275°C for 24

PATENT SPECIFICATION (11) 1 433 890

1 433 890

(21) Application No. 44468/73 (22) Filed 21 Sept. 1973
(23) Complete Specification filed 20 Dec. 1974
(44) Complete Specification published 28 April 1976
(51) INT CL² C22C 21/00
(52) Index at acceptance
C7A 713 742 783 78Y B249 B25X B25Y B289 B309 B319 B325 B327 B329 B32Y B331 B333 B335 B337 B339 B33X B349 B357 B359 B35Y B361 B363 B365 B367 B369 B36X B377 B379 B37Y B381 B383 B385 B387 B389 B38X B399 B419 B425 B427 B429 B42Y B431 B433 B435 B437 B439 B43X B440 B44Y B46Y B475 B477 B479 B481 B483 B485 B487 B489 B48X B509 B50Y B511 B513 B515 B517 B519 B51X B539 B549 B559 B610 B613 B616 B619 B621 B624 B627 B62X B630 B635 B661 B663 B665 B667 B669 B66X B670

(72) Inventors HAMISH DUNDAS WILSON, DAVID FREDERICK GREEN and PETER EDWARD VICKERY

(54) IMPROVEMENTS IN OR RELATING TO BEARINGS

(71) We, VANDERVELL PRODUCTS LIMITED, a British Company of Norden Road, Maidenhead, Berkshire,

do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to bearings and in particular in bearings, formed from alloys of aluminium and tin.

Aluminium tin alloys have thermal conductivities considerably greater than that of steel and so it is considered desirable to form unbacked bearings from aluminium tin alloys so that the heat flow from the bearing surface to the bearing housing is not impeded by the relatively low thermal conductivity of a steel backing on the bearing. Aluminium tin alloys in which the alloy content comprises 18% to 22% by weight of the whole have very good bearing properties but are relatively weak whereas aluminium alloys containing 6% tin by weight are stronger but do not have such good bearing properties.

The invention provides a method of manufacturing a bearing material comprising taking a strip consisting solely of an alloy comprising aluminium and tin in "as cast condition" and containing 18% to 22% by weight of tin, and cold rolling the strip to increase the strength of the strip.

The cold rolling of the strip improves the strength of the strip to a stage where the strip can be used for unbacked bearings.

It is preferred that the cold rolling of the strip is followed by annealing of the strip and it is further preferred that the annealing is following by further cold rolling of the strip.

In the case where the initial hardness of the strip is Rockwell H 50 and the initial ultimate tensile strength is 5. 5. tons per square inch, the first mentioned cold rolling is preferably carried out to increase the hardness to within the range Rockwell H 75 to 95 and increase the ultimate tensile strength to 7 to 12 tons per square inch.

More specifically the strip is so cold rolled that the hardness of the strip after cold rolling is Rockwell H 84 and the ultimate tensile strength is 8.2/8.4 tons per square inch. The elongation of such strip measured using a British Standard test piece to fraction is 10%.

Following the final cold rolling of the strip, the strip is blanked to form bearings such as ring or half thrust washers cylindrical bushes, conical bushes or conical washers.

The following is a description of a specific embodiment of the invention.

The starting material used is cast aluminium tin strip containing approximately 20% tin by weight having a thickness of 15 mm. The strip initially has a hardness of Rockwell H 47 to 52, an ultimate tensile strength of 4 to 6.5 tons per square inch and a British Standard test piece of the material has an elongation at fracture in the range 12 to 20%.

The strip is cold rolled to a thickness of 3.8 mm and is then annealed at 275°C for 24

hours. After annealing the strip is brushed on one side to remove tin sweat and pressure rolled to reduce the thickness of the strip to within the range 2.324 to 2.337 mm. The edges of the strip are sheared to produce a final strip having a thickness of 98.425 mm.

The hardness of the resulting strip is Rockwell H 84, the utlimate tensile strength of the strip is 8.2/8.4 tons per square inch and the elongation of a British Standard test piece tested to fracture is 10%.

The strip has good bearing properties and is sufficiently strong following the cold rolling operations to be used without a conventional steel backing.

Following the cold working of the strip, bearings such as half-bearing liners, cylindrical bushes, thrust washers, conical bushes or conical washers can be made from material using conventional techniques.

It has also been found that small additions of copper, silicon, magnesium, zinc, manganese and iron in a total concentration not exceeding 5% by weight of the total strip improve the strength and bearing properties of the strip still further.

The strip is particularly suitable for the manufacture of thrust washers in which case radially extending oil grooves may be provided on both surfaces of the washers at the same location around the washer so that the washer can be located either way round in the housing.

In the specific example described above, the strip is subjected to two pressing operations to effect cold working of the strip. It is however envisaged that a single cold working operation may be used or the strip may be subjected to multiple cold working operations.

WHAT WE CLAIM IS:—

1. A method of manufacturing a bearing material comprising taking a strip consisting solely of an alloy comprising aluminium and tin in "as cast condition" and containing 18% to 22% by weight of tin, and cold rolling the strip to increase the strength of the strip.

2. A method as claimed in claim 1 wherein the cold rolling of the strip is followed by annealing of the strip.

3. A method as claimed in claim 2 wherein the annealing is followed by further cold rolling of the strip.

4. A method as claimed in any of claims 1 to 3 and in the case where the initial hardness of the strip is Rockwell H 50 and the initial ultimate tensile strength is 5.5 tons per square inch, the first mentioned cold rolling is carried out to increase the hardness to within the range Rockwell H 75 to 95 and increase the ultimate tensile strength to 7 to 12 tons per square inch.

5. A method as claimed in claim 4 wherein the strip is cold rolled such that that the hardness of the strip after cold rolling is Rockwell H 84 and the ultimate tensile strength is 8.2/8.4 tons per square inch.

6. A method of manufacturing a bearing material substantially as described in the example set out hereinbefore.

7. A bearing formed from a bearing material manufactured in accordance with any of claims 1 to 6.

BOULT, WADE & TENNANT,
Chartered Patent Agents,
34, Cursitor Street,
London EC4A 1PQ.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1976.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.